

I. THE MUSEUM CONTEXT

The presence of computers and other technologies is increasingly evident in museums of all kinds. Aside from changing visitor expectations of what might be encountered in a leisurely afternoon museum trip, technology is having a profound impact on the ways in which individuals interact in the museum environment, both with each other and with the information museums contain. This is not to imply that artifact-based exhibits - historically the basis of museums as storehouses for art, history, nature, and culture - are disappearing. On the contrary, technology is being used to highlight the significance of the artifact by providing contextual, historical, or theoretical information, thereby complementing and strengthening the complete museum experience.

Underlying this move to provide broader learning experiences through multiple media, is a recognition of the importance of interactivity in helping to gain new understanding. By immersing the visitor in exhibit experiences and activities, giving them greater control and more options for exploration, visitors discover that fun can also mean learning. Interactivity, in all of its forms, is increasingly seen as the true key to enhancing learning for the museum visitor.

The Educational Purposes of Museums

The museum environment has evolved over time to become a rich opportunity for members of society to enjoy learning about history, art, science, technology, and nature. Interactivity and technology-based exhibits are reflections of the changes toward public education that have taken place in museums, and both are both are playing important roles in defining future museums. The attention to public education that we see today, however, has not always been an important focus for museum professionals.

The word "museum" is defined in the American Heritage Dictionary (2nd ed.) as "an institution for the acquisition, preservation, study and exhibition of works of artistic, historical, or scientific value." Originally from the Latin *mouseion*, which signified a temple dedicated to the nine Muses who served as guiding spirits and sources of inspiration for song, poetry, the arts, and sciences, the word museum has always connoted a place which offers access to objects valued for their aesthetic or historic importance (Alexander, E., 1979, p. 6). Although this common thread has persisted since the first museums, there have been significant changes regarding the function of museums and methods of exhibition, mainly since the turn of the century.

The first museums are frequently traced back to the Greek Temples which housed votive offerings of statues, paintings, gold, silver, and bronze objects in order to attract religious worshippers. But according to Schildt (1988, p. 85), the true beginning of museums as we know them today, as places to admire art and other artifacts, occurred when King Attalus

raided ancient Aegina and acquired a large number of statues that he greatly admired. Having taken the statues from their natural setting he needed to create a substitute, and that became the museum. Later, Romans began displaying paintings and sculptures in forums and public gardens, or more commonly, in the homes of wealthy families (Alexander, E., 1979). Churches and monasteries throughout western Europe upheld the museum concept by collecting religious relics and icons. These collections grew significantly after conquests and invasions, and for the most part remained the personal property of society's aristocrats.

The primary function of museums in these early stages was to collect and study objects of material, aesthetic or historic wealth (Zetterberg, 1968). This association of "collecting" and "scholarly study" with the aristocrats led to the perception that art and scholarship were for a closed circle, namely society's "upper crust." Collections were formed by individuals who wished to show their masterpieces only to the connoisseurs and scholars whom they considered to be their equals (Hudson, 1977). In the 16th century these great collections brought prestige and power to their owners, who did not wish to share their treasures nor their elite position with those outside their social class (Alexander, E., 1979).

Access to these artistic and historical collections began to increase as monarchies were overthrown, churches opened their monasteries to the masses, and as a greater number of individuals claimed it as their right to see the collections (Hudson, 1975; Zetterberg, 1968). The Imperial Gallery in Vienna as well as other museums around Europe started a trend of requiring payment for the privilege to see the art work (Hudson, 1975), but it was not until later in the seventeenth century that museums began to serve the public at large, starting with university museums at Basel in 1671, then at Oxford 12 years later (Alexander, E., 1979, p. 8). Yet even as communities began to gain more widespread access, the attitudes of the museum curators remained the same: visitors were seen as having been granted entrance as a privilege, not as a right (Fisher, 1988, p.47; Hudson, 1977). Museums were run by autocrats who did not consult with anyone about how to collect or organize their collections for viewing - not the state which funded them, nor the public whom they supposedly now served. The collection and exhibition process remained fairly personal and aimless in terms of a public service plan.

Public demand and growing collections fueled the opening of more and more public museums in the eighteenth century. The Vatican established several museums around 1750, and the British Parliament opened the British Museum in 1753 when it purchased Sir Hans Sloane's natural science collection (Alexander, E., 1979). Another great European museum opened in 1793 when France proclaimed its Palace of the Louvre as the Museum of the Republic. Napoleon augmented the Louvre collections through his conquests and confiscations until his fall from power. It was his obsession with the museum as an instrument of national glory that aroused the desires of other European nations to devise similar plans for their museums (Alexander, E., 1979). With the birth of the great European national museums came the desire to open these institutions to the entire population as well as make efforts to attract visitors who could then admire the artifacts (Zetterberg, 1968). In this patriotic function, museums became concerned with display techniques that would help

the lay person appreciate museum collections; labels, docents, and guide-books became standard informational tools (Zetterberg, 1968).

The development of museums in the United States was slower than in Europe but more democratic. The first was the public Charleston Museum founded in 1773, in contrast to the private beginnings of European museums. Other vanguard museums included the Peale Museum in 1782, and the Salem Museum in 1799 (Hudson, 1977). In the mid-1800's the Smithsonian Institution was formed with the goal of aiding in the "increase and diffusion of knowledge" (Alexander, E., 1979, p. 11). Twenty-five years later came three of the greatest American museums, the American Museum of Natural History and the Metropolitan Museum of Art in New York, and the Museum of Fine Arts in Boston, which by the end of the nineteenth century were being visited by large numbers of people (Hudson, 1975).

The success of the Great Exhibition in London in 1851 and of the world fairs thereafter are reported to have given museums the social importance and political power that they had previously lacked (Alexander, E., 1979; Hudson, 1977). These great exhibitions brought to light the necessity to display objects and information in a way that would attract visitors "since they were commercial ventures" and speak to the wide class of people that came to them. The exhibitions also compelled governments to view information about the sciences and arts as important for the entire community (Hudson, 1977), and sometimes the buildings and collections were converted into museums after the expositions were over, e.g., The Exploratorium in San Francisco. By 1900, American museums were seen as places for artistic enlightenment and education (Alexander, E., 1979).

For quite some time, however, museum education was based on a belief that people could and should use their access to the artifacts that museums contain as a way to educate *themselves*. Hudson (1975) referred to this as "open-education," where the only educational responsibility of the museum was to provide the opportunity for learning to take place by collecting and displaying the objects during scheduled hours (p. 61). The method of exhibition used by curators was to show as many objects and artifacts as possible (Finlay, 1977). Adam (1939) called this approach "cafeteria" style display, where you serve yourself to the information contained in the artifact (p.32). In the early 1900's this open-education attitude was modified as more museum curators realized that they would need to provide an element of entertainment and enjoyment for visitors if they were to draw the size audience that would generate adequate funding for these growing publicly funded institutions (Alexander, E., 1979). The goal of the curator became, in part, to increase public appeal of the artifacts by making the past understandable in relation to the present (Booth, Krockover, & Woods, 1982, p. 10). After World War II, more and more museums began to hire professionally trained designers to help curators mount their exhibitions in the most aesthetic, appealing, and information-rich way, selectively displaying and calling attention to their chief treasures (Finlay, 1977, p. 57; Maton-Howarth, 1990, p. 189; Miles, Alt, Gosling, Lewis, & Tout, 1988). Today, most museums have specially trained exhibit designers whose function is to attract, engage, and inform the visitor (Alexander, E., 1979; Miles, et al., 1988).

Recent research indicates that an increasing number of museum professionals are acknowledging and capitalizing on the drawing power of having an element of entertainment or fun in their exhibits (Boram, 1991; Cassedy, 1992; Vance & Schroeder, 1991; Interviews: New England Technology Group, 1992). As examples, the Science Museum of Minnesota describes their exhibits as having a "strong element of entertainment" (Dawson, 1992, p. 1a); many of the interactive multimedia exhibits at the American Museum of Natural History employ learning games to maintain an element of fun (Wertheim, 1992); visitors to the Boston Children's Museum can explore amusing topics, as in the "Bubbles" exhibit which teaches visitors about the properties of bubble film (Feber, 1987). Although this perspective may be more evident in science and children's museums which typically employ the most hands-on and playful exhibits, the personalities of educator and entertainer seem to have merged in many museum environments (Alexander, E., 1979; Hudson, 1977; Miles et al., 1988).

Combining learning and enjoyment helps define the museum as an alternative form of public entertainment that competes with a trip to the movies or other weekend leisure activities (Feber, 1987; Hooper-Greenhill, 1990). It is at least partially in response to this competition that museums are incorporating interactive exhibits and activities that appeal to a media saturated society (Feber, 1987; Ogintz, 1992b). This "infotainment" - information combined with entertainment (also referred to as "edutainment", combined with education) - approach to museum exhibit design has resulted in a number of attention getting strategies. The use of hands-on exhibits, for example, has encouraged visitor participation and enjoyment, and "blockbuster" exhibits such as *The Treasures of Tutankhamen*, represent non-interactive examples of the edutainment strategy (Booth et al., 1982).

Desires to socialize and enrich ourselves intellectually have continued to shape today's museum functions of collection, conservation, research, interpretation and exhibition (Alexander, E., 1979; Weil, 1990). While each of these functions ultimately serves to provide information to the visitor, the heart of the museum as an educational asset is represented in meaningful exhibition which highlights the significance of the artifact to the public. Museums are increasingly being recognized as offering a unique opportunity for people of all ages and cultures to gain information that may not be as accessible to them through traditional school channels and practices (Kelly, 1992), and most museums are intent on heightening community awareness of this characteristic. In addition, the increasing number of museums is allowing more opportunity for this learning to take place.

A study commissioned by the National Endowment for the Arts (NEA) estimated the number of museums with operating budgets of at least \$1,000 per month in 1974 to be 1,821 (NEA, 1974). This figure included art, history, science, and combination museums. The study noted that there were more museums than the 1,821 that did not meet the inclusion criteria, but not how many were omitted. In 1984, the AAM estimated there to be 5,000 museums (which included art and natural history museums, historical sites, science and technology centers, arboretums, planetariums, children's museums, zoos, and botanical gardens) in the US. By 1991, the AAM number rose to approximately 8,100, while the Institute of Museum Services (IMS) estimated the number of museums to be 11,000. Whatever the causes, the growth rates are impressive, even at the conservative estimate of

9% per year (AAM, 1992). Concurrent with the growth in numbers of museums has been a growth in the number of visitors. Museum visitation increased by 50 million between 1975 through 1979 (National Center for Educational Statistics, cited in Booth et al., 1982). Booth et al. attribute these increases to greater public appeal of the exhibits being mounted, increased leisure time, mobility and educational status of visitors, and expanded media coverage of museum events (p. 5). Total annual attendance in all US museums was estimated at approximately 515 million in 1986, 540 million in 1987, and 565 million in 1988 (American Association of Museums, 1992).

As with any developed industry, an infrastructure has emerged as the museum field has grown. In developing a nationwide accreditation program in the 1970's, the American Association of Museums (AAM) defined a museum as "an organized and permanent non-profit institution, essentially educational or aesthetic in purpose, with professional staff, which owns and utilizes tangible objects, cares for them and exhibits them to the public on some regular schedule" (Alexander, E., 1979). The accreditation program was instituted to provide museum professionals with consistent, clear guidelines by which they could judge themselves and others, and to help donors evaluate contribution and grant requests.

Yet the guidelines are not as simple as they purport to be. For example, learning about artifacts cannot take place without collection and study, but the efforts to conserve the artifacts are tested by the need to display them in a public setting, prone to dirt, moisture, and light (Adam, 1939, p. 39; Hooper-Greenhill, 1988, p. 226). The conflicts between objectives have created a dichotomy between museum functions, instead of, as Weil (1990) and Finlay (1939) point out, a more beneficial fusion. According to Weil (1990) this is most evident in the existence of separate education and exhibition departments within many art and history museums (p.60). Hooper-Greenhill states the problem more generally: "the words education, communication, and interpretation are a confused section of museum vocabulary..." (Greenhill, 1985, cited in Maton-Howarth, 1990, p. 191).

Historical differences in museum philosophies and content have led to numerous debates over what qualifies as a museum and what are the most important museum functions (Miles et al., 1988). Some museums see collection or conservation as most important, (Booth, Krockover, & Woods, 1982; Interviews: Behind the Scenes Publishing, 1992; Museum Education Consortium, 1992). Similarly, there have been long-lasting debates about what "educational purpose" means, as its definition has also varied among museums (Adam, 1939; Miles et al., 1988). Some curators might consider an informational database containing the contextual information on an exhibit as education, while others may consider encouragement of academic research a sufficient educational goal. Maton-Howarth (1990) believes that this lack of a clearly defined educational purpose continues to prevent the educational wealth of museums from being fully realized (p. 186). She states that among those museums which have adopted a clearly experiential or interactive approach to educational exhibits are many which have no clear educational policy at all.

These debates show some of the varied perspectives that have existed in the museum community. While the issue of what qualifies as a museum seems to have faded somewhat,

the importance of a museum's educational purpose has only grown (Booth et al. 1982; Chapin & Klein, 1992; *Excellence & Equity*, 1992; Gable, 1992). The latest modification to the AAM definition now describes museums as "institutions of public service and education, a term that includes exploration, study, observation, critical thinking, contemplation and dialogue" (*Excellence & Equity*, 1992, p. 6). This new definition clearly aims to promote the informal educational role of museums by encouraging activities that induce individual responses to exhibits. More specifically, it focuses on non-traditional methods of teaching, encouraging learning in an open, exploratory, user-paced environment. While the official definition may merely represent another nobly worded goal not necessarily supported by actual museum activities, recent research and results from the interviews conducted for this study reflect this new AAM definition.

The History of Interactive Multimedia in Museums

Among the many similarities across the categories of museums is the fact that all museums present visitors with multimedia experiences (Alsford, & Granger, 1987; Bearman, 1993). Multimedia refers to any combination of two or more media used to present information, such as a slide show accompanied by narration or an artifact displayed near descriptive signage. Museums are multimedia experiences since the visitor to any museum is typically exposed to a number of media, such as paintings, historical artifacts, live animals, or informational labels, each of which represents a different communication medium. Museums are also interactive in that a visitor need not experience the exhibits in a linear manner - visitors can move at will from one exhibition room to the next, making use of whatever available media (artifact, brochure, label, audio tape, guide, etc.) they choose to help them explore the museum. In science and children's museums this notion of offering interactive multimedia experiences has a slightly different meaning; visitors of these museums are encouraged and expected to use their senses of sight, hearing, and touch to *physically* interact with the exhibits. Interactive multimedia technologies are yet another element of the multimedia experience that can be found in museums. These refer to the computer-generation technologies that incorporate multiple media, such as text, sound, video, or graphics, into an integrated computer system, which then serves as an exhibit that can inform the visitor on a relevant museum topic using the most appropriate communications media. Throughout this report the phrase interactive multimedia will generally refer to this more recent usage of the term multimedia as opposed to the non-technological definitions.

The use of interactivity and technology in museums has been influenced by the differing objectives and educational philosophies customary to different types of museums. Consider each of the five museum categories examined in this study in turn: art; history; science and technology; children's; and botanical gardens, arboretums, zoos, and aquariums.

Art museums contain collections of paintings, sculptures, pottery, and other noteworthy artistic artifacts. The educational goal of these museums is typically to "train the taste and aesthetic receptiveness of the visitor" (Zetterberg, 1968, p. 47). The interpretation of art,